

REMARKS

Claims 1 to 20 remain pending.

§ 103 Rejections

Claim 1

The Examiner rejected claim 1 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. App. No. 2004/0264806 (“Herley”) in combination with U.S. Pat. No. 5,734,740 (“Benn et al.”), U.S. Pat. App. No. 2004/0028271 (“Pollard et al.”), and U.S. Pat. App. No. 2002/0172417 (“Nicolas”). The Examiner cited Herley for disclosing the preamble, Benn et al. for disclosing the preamble, the first claim element, and the second claim element, Pollard et al. for disclosing the fourth and the fifth claim elements, and Nicolas et al. for disclosing the third and the fifth claims elements. Below Applicant shows that the references when combined do not teach or suggest each and every claim limitation, and there is no reason, suggestion, or motivation to combine the references in the manner suggested by the Examiner.

Herley

The Examiner cited Herley, paragraph [0059], for disclosing the preamble, which recites a method for color matching a first image and a second image where a first region of the first image and a second region of the second image overlap. June 23, 2009 Office Action, pp. 2 and 3. Herley, paragraph [0059], discloses a method for aligning two or more input images, detecting occlusions in the input images, and forming a composite image without any occlusions from the input images. Herley does not disclose a method for color matching overlapping images.

Benn et al., Pollard et al., and Nicolas do not cure the deficiencies of Herley.

Benn et al.

The Examiner cited Benn et al., Fig. 5, for disclosing the preamble, which recites a method for color matching a first image and a second image where a first region of the first image and a second region of the second image overlap. June 23, 2009 Office Action, p. 3. The Examiner also cited Benn et al., Fig. 2, for disclosing the first and the second claim elements, which recite generating first and second histograms of the first and the second regions. Id. Applicant respectfully traverses.

Benn et al. does not disclose color matching two images with overlapping regions by generating histograms of the overlapping regions. Instead, Benn et al. discloses scanning a radiographic film in step S1, generating a binned histogram of scanned image 1 in step S5, dividing scanned image 1 into non-overlapping sub-images 10, 20, and 30 in step S6, generating binned histograms of sub-images 10, 20, and 30, and evaluating all the binned histograms of scanned image 1 and sub-images 10, 20, and 30 to determine quality of the radiographic film in step S9. Benn et al., col. 4, line 63 to col. 5, line 25. Specifically, Benn et al. states that “the digitized image is further divided into a number of non-overlapping regions S6” and “[i]n this particular example, three independent regions 10, 20, 30 (Fig. 1) were chosen.” Benn et al., col. 5, lines 10 to 13 (emphasis added).

Herley, Pollard et al., and Nicolas do not cure the deficiencies of Benn et al.

Pollard et al.

The Examiner repeated her previous arguments that Pollard et al. discloses the fourth and the fifth claim elements and failed to address all of the Applicant’s previous arguments. June 23, 2009 Office Action, p. 3. Per MPEP §707.07(f), “[w]here the applicant traverses any rejection, the examiner should, if he or she repeats the rejection, take note of the applicant’s argument and answer the substance of it.” Accordingly, Applicant respectfully requests the Examiner to address Applicant’s previous argument or otherwise withdraw any rejection based on Pollard et al. Applicant repeats the previous arguments against Pollard et al. below for the Examiner’s convenience.

Pollard et al. does not disclose determining a parameter of the OECF that best matches any two regions, let alone two overlapping regions in two images as recited in the fourth claim element. Pollard et al. only discloses that “a pre-processing stage 92 ... may typically include correction of the OECF ... of the sensor ... to compensate for variations in illuminations.” Pollard et al., paragraph [0108] (emphasis added).

The reference to paragraph [0110] of Pollard et al. by the Examiner does not cure the deficiencies of the Examiner’s assertions. Paragraph [0110] discloses that the invention is applicable to devices with an imaging sensor array having a color filter pattern that is different than the Bayer pattern. Paragraph [0110] is completely unrelated to determining a parameter of the OECF that best matches any two regions, let alone two overlapping regions in two images.

Pollard et al. does not disclose color matching the images by applying the OECF to one of two images as recited in the fifth claim element. The Examiner argued that a post-processing step 96 in the flowchart of Fig. 12 and paragraph [0108] of Pollard et al. disclose the same. However, paragraph [0108] of Pollard et al. discloses applying post-processing step 96 to perform exposure correction and transform the pixel values to a standard color space (e.g., RGB). It does not disclose applying the OECF to one of two images to color match the images.

As discussed above, Benn et al. does not disclose generating histograms of overlapping regions of two images and determining corresponding pixel values from the histograms. Thus, the combination of Pollard et al. and Benn et al. cannot disclose determining at least one parameter of the OECF that best matches the corresponding pixel values from such histograms.

Herley, Benn et al., and Nicolas do not cure the deficiencies of Pollard et al.

Nicolas

The Examiner cited Nicolas, paragraph [0033], for disclosing the third claim element, which recites determining corresponding pixel values from the first and the second histograms. June 23, 2009 Office Action, p. 4. Applicant respectfully traverses.

Nicolas does not disclose determining corresponding pixel values from two histograms. Instead, Nicolas discloses comparing two histograms to determine if a second histogram is much lower than a first histogram or if the second histogram is substantially equal to the first histogram. Nicolas, paragraphs [0033] to [0035].

As discussed above, Benn et al. does not disclose generating histograms of overlapping regions of two images and determining corresponding pixel values from the histograms. Thus, the combination of Nicolas and Benn et al. cannot disclose determining corresponding pixel values from such histograms.

The Examiner also cited Nicolas, paragraph [0068], for disclosing the fifth claim element, which recites color matching the images by applying the OECF to one of two images. June 23, 2009 Office Action, p. 4. Applicant respectfully traverses.

Nicolas does not disclose applying the OECF function for color matching, nor is it obvious to substitute the OECF function for the disclosed image improvement algorithms disclosed in Nicolas.

As discussed above, Nicolas discloses comparing two histograms. Nicolas, paragraph [0033]. When a second histogram is much lower than a first histogram, the pixels of a first set is located in a flat region. Nicolas, paragraph [0034]. When the second histogram is substantially equal to the first histogram, the pixels of the first set is located in a texture region. Nicolas, paragraph [0035]. Based on the determination, noise reduction is applied to a flat region or edge enhancement is applied to a texture region. Nicolas, paragraphs [0025] and [0026]. As can be seen, Nicolas does not disclose color matching. Thus, one skilled in the art would not replace the noise reduction or edge enhancement in Nicolas with OECF.

Herley, Benn et al., and Pollard et al. do not cure the deficiencies of Nicolas.

Suggestion or Motivation to Combine Herley, Benn et al., Pollard et al., and Nicolas

The Examiner argued that Herley, Benn et al., Pollard et al., and Nicolas. are in the same field of color image processing, and more specifically color correction. June 23, 2009 Office Action, p. 4. The Examiner then argued:

The suggestion/motivation for combining the teachings of Herlye, Benn, Pollard, and Nicolas would have been to classify pixels via histogram processing and based on that classification, color matching, determining whether the pixels belong to texture or to flat regions by comparing 2 histograms, one taking into account all the pixels with the color in the predetermined range of color values, the second one counting only these same pixel values if their luminance value differs more than a given threshold from the luminance of their neighbor, at abstract Nicolas.

Office Action, p. 5. Applicant respectfully traverses. Applicant first summarizes Herley, Benn et al., Pollard et al., and Nicolas hereafter.

Herley discloses a method for generating a composite image of a scene without any occlusions. The method includes aligning two or more input images of the scene, detecting occlusions in the input images, and forming the composite image without any occlusions from the input images. Herley, paragraph [0059].

Benn et al. discloses a method for evaluating the quality of radiographic films. The method includes scanning the radiographic film, generating a binned histogram of the entire scanned image, dividing the scanned image into non-overlapping sub-images, generating binned histograms of the sub-images, and evaluating the binned histograms of the scanned image and the sub-images to determine quality of the radiographic film. Benn et al., col. 4, line 63 to col. 5, line 25.

Pollard et al. discloses a method to color correct a color image by splitting the image into a low frequency image and a high frequency image. The low frequency image may be color corrected and then combined with the high frequency image to provide a color corrected image. When the method is implemented in a digital camera, it includes a pre-processing stage before the color correction where the OECF of the image sensor is corrected to compensate for variation in lighting.

Nicolas discloses a method for improving an image by removing noise from an image. Nicolas, paragraphs [0059] to [0067]. The method includes determining a first set of pixels in the image that are in a predetermined range of color values, generating a first histogram of the first set of pixels, generating a second histogram of a second set of pixels selected from the first set that each has a color value greater than a neighboring pixel by a predetermined threshold, comparing the first and the second histograms to determine the classification for the first set of pixels, and reducing the noise the image according to the classifications of the pixels. Nicolas, paragraphs [0059] to [0067].

While Pollard et al. discloses a method to color correct an image, Herley discloses a method to generate a composite image of a scene without occlusions, Benn et al. discloses a method to evaluate the quality of radiographic films, and Nicolas discloses a method for removing noise from an image. Thus, one skilled in the art would not consider Herley, Benn et al., and Nicolas because they are nonanalogous arts that address problems different from the present application, which is the color correction of two overlapping images.

Even assuming one skilled in the art would consider these references, there is no reason, suggestion, or motivation to combine the references in the manner proposed by the Examiner. The Examiner cited Herley to disclose the preamble. The Examiner next cited Benn et al. for also disclosing the preamble, and for disclosing the first and the second claim elements. However, Benn et al. cannot disclose the preamble as it does not disclose the processing of overlapping images. Thus, Herley and Benn et al. must be combined to show the preamble, the first claim element, and the second claim element.

There is no reason, suggestion, or motivation for the skilled person to combine Herley and Benn et al. There is no evidence that modifying Herley with the binned histograms of Benn et al. would assist Herley in generating a composite image free of occlusions. Conversely, there is no evidence that modifying Benn et al. with the overlapping images of Herley would assist Benn et al. in determining the quality of the radiographic film. Furthermore, Benn et al. teaches against such a modification as it explicitly discloses applying the binned histograms to non-overlapping sub-images.

The Examiner next cited Nicolas for disclosing the third claim element. However, Nicolas does not disclose determining the correspondence of pixel values from two histograms. Even assuming it does, there is no reason, suggestion, or motivation for the skilled person to combine Nicolas with Herley and Benn et al. There is no evidence that modifying Herley and Benn et al. with Nicolas would assist Herley in generating a composite image free of occlusions or Benn et al. in determining the quality of the radiographic film. Conversely, there is no evidence that modifying Nicolas with Herley and Benn et al. would assist Nicolas in removing noise from an image.

The Examiner next cited Pollard et al. for disclosing the fourth and the fifth elements. However, Pollard et al. does not disclose determining a parameter of the OECF that best matches corresponding pixel values from two images and color matching the two images with the OECF. Even assuming it does, there is no reason, suggestion, or motivation for the skilled person to combine Herley, Benn et al., and Nicolas with Pollard et al. There is no evidence that modifying Herley, Benn et al., and Nicolas with Pollard et al. would assist Herley in generating a composite image free of occlusions, Benn et al. in determining the quality of the radiographic film, or Nicolas in reducing noise in an image. Conversely, there is no evidence that modifying Pollard et al. with Herley, Benn et al., Nicolas would assist Pollard et al. in color correcting an image. Furthermore, Pollard et al. teaches against such a modification as it explicitly discloses the correction of OECF as a pre-process that occurs before color correction.

The Examiner also cited Nicolas for disclosing the fifth element. However, Nicolas does not disclose color matching the two images with the OECF. Even assuming it does, there is no reason, suggestion, or motivation for the skilled person to combine Herley, Benn et al., and Pollard et al. with Nicolas. There is no evidence that modifying Herley, Benn et al., and Pollard et al. with Nicolas would assist Herley in generating a composite image free of occlusions, Benn et al. in determining the quality of the radiographic film, or Pollard et al. in color correcting an image. Conversely, there is no evidence that modifying Nicolas with Herley, Benn et al., and Pollard et al. would assist Nicolas in removing noise from an image.

Applicant respectfully submits that Examiner used impermissible hindsight in reconstructing the invention of claim 1 by using the claim as a roadmap to locate the claim elements in unrelated references dealing with different problems. This is a luxury that a skilled person when presented with the challenge of color matching overlapping images and the references of Herley, Benn et al., Pollard et al., and Nicolas simply does not have.

For all of the above reasons, claim 1 is patentable over Herley, Benn et al., Pollard et al., and Nicolas.

Claims 16

Claim 16 recites similar limitations as claim 1 and it is patentable for at least the same reasons as claim 1.

Claims 2 to 3, 11 to 13, and 16

Claims 2 to 3, 11 to 13, and 16 depend directly or indirectly from claim 1 or 16, and they are patentable for at least the same reasons as claims 1 and 16.

Allowable Subject Matter

The Examiner indicated that claims 5 to 10, 14, 15, and 17 to 20 are allowable if rewritten in independent form including all of the limitations of their base claims and any intervening claims. Applicant has not amended these claims to independent form because Applicant believes that their base claims are patentable over the cited references.

Summary

Claims 1 to 20 remain pending. For the above reasons, Applicant respectfully requests the Examiner to withdraw the claim rejections and allow claims 1 to 20. Should the Examiner have any questions, please call the undersigned at (408) 382-0480.

I hereby certify that this correspondence is being transmitted prior to expiration of the set period of time by being transmitted via the Office electronic filing system in accordance with § 1.6(a) (4).

/David C Hsia/
Signature

September 23, 2009
Date

Respectfully submitted,

/David C Hsia/

David C. Hsia
Attorney for Applicant(s)
Reg. No. 46,235

Patent Law Group LLP
2635 North First St., Ste. 223
San Jose, California 95134
408-382-0480x206